39. The method of claim 28 further comprising displaying the identified chemical substance.

40. The method of claim 28 further comprising displaying a confidence level associated with the identified chemical elements.

41. The method of claim 28 further comprising displaying a confidence level associated with the identified chemical substance.

42. The method of claim 40 wherein said confidence level is computed from intensities, uncertainties and multiplicities of gamma-ray peaks associated with a given chemical element.

REMARKS

Claims 1-15 have been rejected and an objection to the drawings has been made. Applicants have amended claims 1 and 10; claims 2-9 and 11-15 have been cancelled; new claims 16-42 have been added; and claims 1, 10 and 16-42 remain in the application. Reexamination and reconsideration of the application are requested.

In response to the Examiner's objection to the drawings, a Substitute Drawing Request is provided herein in which substitute drawing sheets 8 and 9 are submitted to correct the typographical errors noted by the Examiner. No new matter is contained in the new drawing sheets. Applicant respectfully requests formal acceptance of the substitute drawings to the file.

The Examiner has objected to the specification because of formalities. More specifically the Examiner stated that in line 10, page 26 "7790.16 keV" should probably be –7790.10 keV–. However,

Applicants respectfully contend that the original energy level is the correct figure and that no amendment is necessary. The second informality objected to by the Examiner has been corrected as suggested by the Examiner.

The Examiner noted that the terms GMX and Nomad Plus should be capitalized and accompanied by the generic terminology. In response to this comments Applicants understand that neither term is a registered trademark with the USPTO and accordingly Applicants believe that the product names as referenced in the application are appropriate.

Accordingly, in view of the foregoing and amendment, Applicants respectfully request that the Examiner withdraw his objections based on informalities.

Claims 10-15 stand rejected under 35 U.S.C. § 112, second paragraph. Applicants have amended independent claim 10 to overcome the indefinite language noted by the Examiner, and Applicants believe that this ground for rejection can be withdrawn.

Before further discussing rejections based upon 35 U.S.C. § 102, it is believed proper to state that to sustain a rejection under § 102 the Patent and Trademark Office must abide by the following statement of the law.

> Under 35 U.S.C. § 102, anticipation requires that each and every element of the claimed invention be disclosed in a prior art reference. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). In addition, the prior art reference must be enabling, thus placing the allegedly disclosed matter in the possession of the public. *In re Brown*, 329 F.2d 1006, 1011, 141 USPQ 245, 249 (CCPA 1964).

With the above background in mind the rejections under 35 U.S.C. § 102 will be discussed.

Claim 1 has been rejected under 35 U.S.C. § 102(e) as being anticipated by Vourvopoulos. In response to this rejection, Applicants have amended independent claim 1 to include, inter alia, a

continuously-emitting neutron source (cf.: pulsed neutron source of Vourvopoulos, see column 4, lines 21-28), a single, high-resolution and spectrum of at least 4096 channels (cf.:Vourvopoulos uses multiple spectra (column 7, lines43-45); and between 100-300 channels (Figures 2-6)); and peak-by-peak fit analysis (cf.: Vourvopoulos full spectrum de-convolution software using multiple iterations (see, column 7, lines41-64).

As amended, each element of claim 1 is are no longer anticipated by Vourvopoulos and it is respectfully requested that this ground for rejection be withdrawn. If the Examiner is of the opinion that claim 1 should be rejected as being under 35 U.S.C. § 103, it is requested that the Examiner provide a non-final rejection so that Applicants may have an opportunity to consider and address the rationale for such a conclusion.

Claims 2-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Vourvopoulos in view of Scott. In view of the amendments to independent claims 1 and 10, it is respectfully asserted that neither Vourvopoulos nor Scott, taken singly or in combination, disclose the claims, as amended, of the present application. For example, neither independent claim refers to the least squares fit analysis for which Scott was cited by the Examiner. Additionally, the present invention utilizes a continuous neutron source rather than a pulsed source of Vourvopoulos or the electronically gated-technique of Scott. The claims of the present invention refer to the peak-by-peak analysis of high-resolution gamma-ray spectra, rather than the cumbersome de-convolution/unfolding analysis necessary for low-resolution gamma-ray spectra of cited references. The present invention uses a single energy spectrum comprising simultaneously detected inelastic scatter and capture gamma-ray energies. This is a significant advantage over the Vourvopoulos technique of acquiring multiple energy spectrum (i.e., background gamma rays, inelastic scattering gamma rays, and neutron capture

gamma rays).

Accordingly, in view of the amendments to independent claims 1 and 10, it is believed that proposed combination of Vourvopoulos and Scott is moot, and it is respectfully asserted that this grounds for rejection can be withdrawn.

Applicants have added several new claims to better define the invention. No new matter has been added as a result of these new claims. Support in the application for the new claims is provided below.

Claim 16	page 7, lines 4-14
Claim 17	page 8, lines 3-25; page 27, line 2 through page 36, line 2; Fig. 8a and Fig. 8b
Claim 18	Fig. 10
Claim 19	Fig. 10
Claim 20	Fig. 10
Claim 21	Fig. 10
Claim 22	Fig. 9A and Fig. 9B
Claim 23	page 21, line 18 through page 22, line 3
Claim 24	page 21, line 18 through page 22, line 3
Claim 25	page 21, line 18 through page 22, line 3
Claim 26	page 21, line 18 through page 22, line 3
Claim 27	Fig. 7B; page 13, lines 24-16; page 24, lines 7-17
Claim 28	page 5, line 12 through p9, line 1; page 19, line 5 through page 27, line 25; Fig. 7a; Fig. 7B; Fig. 8A, Fig. 8B, Fig. 9a and Fig.

9b.

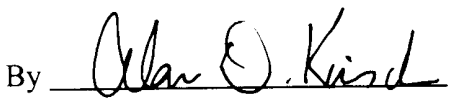
Claim 29	Fig. 9A
Claim 30	Fig. 9A and Fig. 9B
Claim 31	page 21, line 18 through page 22, line 3
Claim 32	page 21, line 18 through page 22, line 3
Claim 33	page 21, line 18 through page 22, line 3
Claim 34	page 21, line 18 through page 22, line 3
Claim 35	page 25, lines 3-5
Claim 36	page 7, lines 4-14
Claim 37	Fig. 7B; page 13, lines 24-26; page 24, lines 7-17
Claim 38	Fig. 10
Claim 39	Fig. 10
Claim 40	Fig. 10
Claim 41	Fig. 10
Claim 42	page 44, line 19 through page 46, line 21

For the foregoing reasons, it is respectfully asserted that the Examiner has not established a prima facie case of obviousness and it is requested that this ground for rejection be withdraw and the claims found in a condition of allowance.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached pages are captioned **"Version with markings to show changes made"**.

In view of the above amendment and remarks, Applicants believe this application should be considered ready for allowance and Applicants earnestly solicit an early notice of the same. Should the Examiner be of the opinion that a telephone conference would expedite prosecution of the subject application, please call the undersigned at the below-listed number.

RESPECTFULLY SUBMITTED,

By 

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(208)-526-1371

Date 4/23/02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	
	)	
Augustine J. Caffrey et al.	)	
	)	
Serial No. 09/537,906	)	Examiner: Lee
	)	
Filed 03/28/00	)	Group Art Unit: 2876
	)	
Atty. Dkt.: LIT-PI-553	)	
	)	
For: PINS Chemical Identification Software	)	
	)	

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

The following paragraphs have been amended as follows: Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

The paragraph beginning on page 7, line 21 through page 8, line 1:

To determine the calibration constants, the algorithm first searches the spectrum for peaks significantly above the background. The centroids of these peaks are matched to a specified pattern to identify the individual peaks. Then, a ~~non-linear~~ linear least square fit of experimental peak energies versus expected peak energies is performed to determine the three constants.

The paragraph beginning on page 45, line 15 through page 46, line 13:

After all the peaks from the element have been processed, the conf_array is used to determine the overall confidence of that element. This is ~~accomplised~~ accomplished by a confidence table being created for each element. The table contains a series of conf_array values that must be met or exceeded to meet that confidence level. For example, to achieve a 50% confidence level, 2 peaks with 20% or less error along with 3 peaks of 60% or less error may be required (e.g. (2,0,1,0,0)). There are approximately 7 distinct table entries that are checked against the conf_array values. The first one that is met or exceeded determines the overall confidence measure for that element. A confidence level is assigned to each of the table entries in the confidence table and the highest level met or exceeded is used in reporting the confidence of the element. For example, if the conf_array is [2,0,1,1,0] as described above, and the confidence table is [[4,0,0,0,0], [3,1,0,0,0], [1,1,1,0,0], [0,1,2,0,0], [0,0,3,0,0], [0,0,2,1,0], [0,0,1,2,0]], then the third confidence level would be met [1,1,1,0,0]. ~~Aat~~ At a minimum, one peak with less than 20% uncertainty, an additional peak with less than 40% uncertainty, and a third peak with less than a 60% uncertainty).

In the Claims:

The claims have been amended as follows: Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

CLAIMS

1. (Once Amended) A method for identifying a chemical ~~compound~~ substance, the method

comprising:

exposing said chemical ~~compound~~ substance to neutrons from a continuously-emitting neutron source;

~~detecting~~ measuring, with a high-resolution detector, gamma rays emitted by said chemical ~~compound~~ substance as a result of exposure to said neutrons;

creating a single, high-resolution spectrum ~~comprising an energy scale~~ of at least 4096 channels and a detection count~~, said energy scale corresponding to the energies of said gamma rays and~~ per spectrum channel, said detection count corresponding to the number of detected gamma rays;

calibrating ~~said~~ an energy scale of said spectrum;

performing ~~an analysis on said spectrum to determine the presence of at least one chemical element within said chemical compound; and~~ a peak-by-peak analysis of the corresponding gamma-ray energies of chemical elements of interest on said spectrum; and

identifying said chemical ~~compound~~ substance based on said peak-by-peak analysis of said spectrum.

2. Cancelled

3. Cancelled

4. Cancelled

5. Cancelled

6. Cancelled

7. Cancelled

8. Cancelled

9. Cancelled

10. (Once Amended) ~~An~~ A system for identifying a chemical ~~compound~~ substance, said ~~apparatus~~ system comprising:

a neutron source for continuously delivering neutrons into said chemical ~~compound~~ substance;

a high-resolution multichannel analyzer operatively associated with a high-resolution gamma-ray detector ~~for detecting gamma rays emitted by said detector~~;

a computer operatively associated with said ~~gamma-ray detector~~ multichannel analyzer; and

a computer-readable medium operatively associated with said computer, said computer-readable medium containing instructions for controlling said computer to identify said chemical ~~compound~~ substance by:

storing first data representative of gamma-ray peak energies corresponding to at least one pre-selected chemical element;

sorting said first data in a pre-selected order having a first peak energy and a last peak energy;

receiving second data representative of gamma-ray counts, wherein said gamma rays are generated by said chemical ~~compound~~ substance as a result of exposure to said neutrons, and said second data ~~has~~ having peaks associated therewith;

~~sorting~~ searching said second data in a pre-selected order having a first peak and a last peak;

~~comparing said energies from said first data to said peaks from said second data by comparing said first peak energy through said last peak energy from said first data to said first peak through said last peak from said second data;~~

~~performing a least-squares fit analysis of said peaks from said second data versus said energies from said first data;~~

~~analyzing said spectrum based on said least-squares fit analysis to determine at least one chemical element within said chemical compound; and~~

~~identifying said chemical compound based on said analyzing of said spectrum~~

comparing said energies from said first data to said peaks from said second data by comparing said peak energies from said first data to said peaks and peak centroids from said second data;

calibrating an energy scale of said gamma-ray spectrum from said centroid positions and said first data;

extracting net areas and energies of said peaks;

calculating intensities of said peaks from said extracted net areas and counting times;

identifying chemical elements and their concentrations contained in said chemical substance from said energies and intensities of said gamma-ray peaks and said second data;

identifying said chemical substance by determining a concentration, if any, of a first element selected from the group of phosphorous and chlorine, and a concentration, if any, of second elements selected from the group of arsenic, boron, hydrogen, nitrogen, oxygen, phosphorous, sulfur, silicon, titanium and zinc.

11. Cancelled

12. Cancelled

13. Cancelled

14. Cancelled

15. Cancelled